WHAT WE CLAIM IS:

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1. A coated optical fiber comprising at least one radiation-cured layer and an optical fiber substrate,

wherein said radiation-cured at least one layer has been cured by exposing said at least one layer to low power electron beam radiation effective to substantially cure said at least one layer but substantially avoid degrading said optical fiber substrate.

2. The coated optical fiber of claim 1, wherein said at least one radiation-cured layer comprises a pre-cure composition comprising:

a) about 10% to about 95% of at least one reactive oligomer;

b) about 10% to about 95% of at least one reactive diluent;

c) optionally, about 0 to about 10% of at least one photoinitiator; and

d) optionally, about 0 to about 10% of at least one additive,

wherein said optical fiber substrate comprises a member of the group consisting of glass and thermoplastics,

wherein said electron beam radiation has an energy less than about 125 kV, and

wherein said at least one layer comprises a member selected from the group consisting of an inner primary coating, an ink layer and a colored outer primary layer.

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3. The coated optical fiber of claim 1, wherein said radiation-cured layer was cured without substantial presence of photoinitiator.

4. The coated optical fiber of claims 1 or 2, wherein said low power electron beam radiation is generated by an apparatus comprising a plurality of electron beam tubes, each tube emitting a stripe-like electron beam through an electron beam permeable, low-Z, gas impermeable window.

5. A coated optical fiber comprising at least one radiation cured matrix material coating composition and an optical fiber substrate,

wherein said at least one radiation-cured matrix material coating composition has been cured by exposure to low power electron beam radiation effective to substantially cure said at least one radiation-cured matrix material coating composition, but substantially avoid degrading said optical fiber substrate,

wherein said at least one radiation-cured matrix material coating composition comprises:

a) about 10% to about 90% of at least one reactive oligomer;

b) about 10% to about 80% of at least one reactive diluent;

c) optionally, about 0 to about 10% of at least one photoinitiator;

d) optionally, about 0 to about 10% of at least one additive, and

wherein said coated optical fiber comprises a member selected from the group consisting of glass and thermoplastics.

6. A method of curing at least one radiation-curable layer surrounding an optical fiber substrate comprising the steps of:

a) applying at least one radiation-curable layer surrounding said optical fiber substrate; and

b) substantially curing said at least one layer with about 125 kV of electron beam radiation.

7. A method of curing multiple radiation-curable layers surrounding an optical fiber substrate comprising the steps of:

a) applying one of said multiple radiation-curable layers surrounding said optical fiber substrate; and

b) substantially curing said at least one layer with about 125 kV of electron beam radiation; and

sequentially repeating said step a) said step b) for each of said multiple radiation-curable layers surrounding said optical glass fiber substrate.

8. The method of claim 6, wherein said electron beam radiation has an energy of less than about 125 kV.

~~9~~. The method of claim ~~8~~, wherein said energy is less than about 80 kV.

~~10~~. The method of claim ~~9~~, wherein said energy is less than or equal to about 60 kV.

11. The method of claim 9, wherein said layer is substantially cured to a depth of about 25 mm or less.

~~12~~. The method of claim ~~9~~, wherein the low power electron beam radiation is generated by an apparatus comprising a plurality of electron beam tubes, each tube emitting a strip-like electron through an electron beam permeable, low-Z, gas impermeable window.

~~13~~. The method of claim ~~12~~, wherein said tubes are arranged in more than one group, each group having different beam energies.

~~14~~. The method of claim ~~12~~, wherein said tubes are arranged in three groups, each group being arranged at about 120° angles from one another.

~~15~~. The method of claim ~~12~~, wherein said tubes are arranged in at least two groups, each group being arranged at about 180° angles from another of said groups.

15 ~~16~~. The method of claim ~~12~~ 11, wherein the apparatus further comprises a means for advancing the optical fiber past said plurality of electron beam tubes.

14 ~~17~~. A method of curing radiation-curable matrix material coating compositions on optical fiber substrates, comprising the steps of:

a) applying at least one radiation-curable matrix material composition to coat said optical fiber substrates; and

b) substantially curing said at least one radiation-curable matrix material coating composition with about 125 kV or less of electron-beam radiation in a single pass.

17 ~~18~~. The method of claim ~~17~~ 16, wherein the distance between said electron beam and said at least one matrix material coating composition is about 0.1 cm to about 2 cm, measured from surface of the electron beam window to the surface of said matrix material coating composition.